DOCUMENT RESUME

ED 145 403 CS 003 748

AUTHOR	Mason, Jana M.
TITLE	Reading Readiness: A Definition and Skills Hierarchy from Preschoolers' Developing Conceptions of Print. Technical Report No. 59.
INSTITUTION	Bolt, Beranek and Newman, Inc., Cambridge, Mass.; Illinois Univ., Urbana. Center for the Study of Reading.
SPONS AGENCY	National Inst. of Education (DHEW), Washington, D.C.
PUB DATE	Sep 77
CONTRACT	400-76-0116
NOTE	57p.
EDRS PRICE	MF-$0.83 HC-$3.50 Plus Postage.
DESCRIPTORS	*Beginning Reading; Early Childhood Education; *Early Reading; Longitudinal Studies; Reading Instruction; *Reading Readiness; Reading Readiness Tests; *Reading Research; Word Recognition
IDENTIFIERS	*Center for the Study of Reading (Illinois)

ABSTRACT

Preschool children's knowledge of printed words and letters was studied longitudinally, in order to achieve a definition and an ordering of reading readiness activities. Middle-class children were tested to determine what they knew about print, they were given word learning and word recognition tasks, and their parents returned questionnaires which assessed their perceptions of their children's developing understanding of print. The results indicate that an appreciable knowledge of printed words and letters and ways to recognize words exists before children receive formal reading instruction. Additionally, because the children showed a uniformly similar order of acquisition of this knowledge, it was concluded that a hierarchy for reading readiness exists and can serve as a basis for definition, testing, and instruction. (Author)

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CENTER FOR THE STUDY OF READING

Technical Report No. 59

READING READINESS: A DEFINITION AND SKILLS HIERARCHY FROM PRESCHOOLERS' DEVELOPING CONCEPTIONS OF PRINT

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The present research was partially supported by funds from the Research Board at the University of Illinois and in part by the National Institute of Education under Contract No. US-NIE-C-400-76-0116. The data was collected with the help of L. J. Fyans, L. Gottselig, C. Cook, and W. Zoellick and was analyzed with the appreciable assistance of W. Zoellick. The author wishes to thank these people and the staff at the Children's Preschool and Daycare Centers, University of Illinois, for their cooperation and effort.

CS003748

Abstract

Preschool children's knowledge of printed words and letters was studied longitudinally in order to achieve a definition and an ordering of reading readiness activities. Middle class children were tested to determine what they knew about print, they were given word learning and word recognition tasks, and parents returned questionnaires which assessed their perceptions of their children's developing understanding of print. The results indicate that an appreciable knowledge of printed words and letters and ways to recognize words exists before children receive formal reading instruction. Additionally, because the children showed a uniformly similar order of acquisitior of this knowledge, it was concluded that a hierarchy for reading readiness exists and can serve as a basis for definition, testing, and instruction.

Reading Readiness: A Definition and Skills Hierarchy from Preschoolers' Developing Conceptions of Print

Introduction

Educators have distinguished prereading and metareading knowledge from initial formal reading instruction by labeling the first, "reading readiness," and the second, "beginning reading." Both have been defined loosely. For example, reading readiness is that period when the child can be approached with reading preparatory activities and when an instruction can be easily and profitably initiated (Downing & Thackray, 1971). Reading readiness is just like talking readiness (basal-reader author quoted by Chall, 1967, p. 57). Any reading readiness program must begin with the child's own language (Smith, Goodman, & Meredith, 1976, p. 290). Readiness is a relationship between the abilities of the child (as represented by an interplay between the environment and heredity) and the abilities required to be successful with beginning reading (which is affected by the kind and quality of instruction) (Durkin, 1974, p. 124). By contrast, beginning reading is described as the process of turning printed symbols into sounds (McCracken & Walcutt, 1963), the translation of print into both their sounds and meaning (Downing & Thackray, 1971), or the realization that letter sounds are predictable and can become the basis for identifying printed words (Mason, 1976). Altogether, the definitions suggest that readiness has a strong language component while beginning reading deals with processing or recognizing printed information.

The definitions notwithstanding, it is apparent from a perusal of reading readiness programs that an agreed upon instructional definition of reading

readiness does not exist. Until quite recently, reading readiness programs were relegated to the kindergarten classes, typically unsupervised or unstructured, left to the whim of the teacher (Durkin, 1970). This disregard probably stems from the belief that prevailed in the 1930's that an optimal time can be found for any instruction based on the maturational level of the child. Since the age of 6.5 was chosen (by Morphett & Washburne, 1931), the kindergartener was considered too young for formal reading instruction. Instead, kindergarten children were put into programs called reading readiness. These programs often included workbook materials in which a child practiced matching circles to circles, finding the picture that was exactly the same as the one on the left, or coloring inside the lines.

Some programs in current use have continued to rely on these tasks as a basis for reading readiness activity. Others have centered on language; still others have attempted to identify prerequisite letter and word reading skills. For example, the Ginn 360 readiness program emphasizes printing and letter names and sounds, the Gage series favors spoken language practice and story construction, Scott-Foresman includes printing and paper and pencil hand-eye coordination activities, while SRA (Distar) emphasizes symbol-sound identification, sequencing, blending and rhyming. In one case, Venezky (1975) constructed a program from a logical analysis of reading tasks that are conventionally chosen for initial reading instruction. Those skills which the research shows to be typically lacking in the first grade child were selected for his prereading program. These differences among programs indicate that there is little agreement about readiness; the

disparity suggests that neither a common definition nor a prevailing program for reading readiness is presently available.

Unanimity about reading readiness instruction might be obtainable through empirical investigations of the preschool child's understanding of print. Durkin (1966), observing children who learned to read before entering school, determined that early readers had the following similar characteristics or conditions: (1) interest in writing preceded interest in reading, (2) interest in reading was closely connected with the child's personal life, (3) number and letter interest accompanied learning to read, (4) whole word reading instruction rather than phonics was given by parents or older siblings, (5) parents read to the children frequently, (6) parents interrogated and discussed story and TV topics with children. On the basis of this research, Durkin (1970, 1974) constructed and measured the effectiveness of a reading readiness program using a control-experimental group procedure. She found that the experimental program facilitated reading at first but after three years there were no differences between the groups.

Durkin's work provided empirical evidence for the notion of essential and definable prereading skills. Through other empirical work, these have been more closely defined or elaborated on (Bereiter & Englemann, 1966; Calfee, Venezky, & Chapman, 1972; Downing, 1972; Ehri, 1977; Francis, 1977; Flood, 1977; MacKinnon, 1959; Mason, 1977; and Soderberg, 1971). Skill areas that have been studied include language experience, alphabet recognition, whole word recognition, sentence reading, a conceptual understanding of words and letter sounds, classification ability, and parental questioning.

Empirical documentation of these skills is still warranted since the components of reading readiness programs have not been agreed agreed upon. Current reading readiness programs which are based on traditional practice or logical analyses of basic skills do not necessarily identify essential skills that lead the nonreader to reading.

Carroll (1970) argued that the skill sequence in reading is a basic, unresolved issue: it has not been determined whether children should first learn to dissect words into sounds or to learn to recognize words by a holistic process. Durkin touched on the issue of skill order, finding that for early readers printing preceded whole word reading and word reading could occur without phonics instruction. These effects suggest that Carroll's either-or question is the wrong question. Knowledge of print and writing, but not dissecting spoken words, may be the first step, then followed by a holistic procedure. Durkin's study, however, needs to be replicated with more typical children and under more controlled conditions to determine the universality of the skill order she described.

For this paper, 4-year-old, middle class children were tested for nine months as they learned about words and letters in print. It was expected thereby to obtain information about children's knowledge of print, how their understanding of print changed, and in what order they acquired that knowledge. Observation, parental report, and letter and word knowledge tests were chosen to measure change.

It was presumed that the central issues lay in the development of letter knowledge, printed word knowledge, and the interplay of these two

areas. Although language and cognitive abilities are also assumed to be valid prerequisites to reading, these were ignored in this study by choosing normal, middle class children as subjects to control to some extent for language and cognitive maturity. Thus, the study, while not generalizable to other population groups, is intended to provide guideposts for understanding the acquisition of reading readiness skills when satisfactory language and cognitive experiences have been provided in early childhood. From this, the study of atypical development becomes possible.

Overview of the Research

Testing was conducted over a 3-year period with children who attended a university-operated preschool and day care center in a small midwestern city. Two groups of children were placed in contrasting informal reading programs in order to determine whether a word-focused program would have a different effect on early reading from a letter-focused program. Several tests were constructed to measure these differences and a questionnaire, filled out by parents at the beginning and end of the school year, was intended to assess parents' perceptions of word and letter development. Additionally, learning experiments were devised to determine under what conditions children could remember the pronunciation of printed words or could recognize words.

The research was conducted at a university preschool center containing balanced-by-sex groups of 20-22 children and a day care center consisting of 25-30, 3-5-year-olds. Based on parental response to a questionnaire and initial testing, it was possible to assume that the groups of preschoolers were socially and academically similar.

The children were from middle and upper-middle income families. Several of the fathers were university professors; others were in business-related occupations. All of the children in the preschool center had two parents living at home while only one mother had a full-time job outside the home. Most of the day care children lived with one parent, the mother, who held an outside job. None of the children showed any social, emotional, or physical handicaps.

Children were tested individually in separate experimental testing rooms following which they received a prize of an inexpensive toy. Since the children were tested by other researchers as well, they were accustomed to the testing procedure and participated willingly.

Experimenters were graduate students and undergraduate student teachers who had been trained by the author. For most of the testing they worked in teams of two to complete a test within one week.

Experiment 1

Achieving control over what is taught to children is always extremely difficult in educational research. Yet, to observe the development of word and letter knowledge, some control over the child's school environment was felt necessary. The method of control achieved here was arranged by specifying to teachers of a preschool, where the author was the director, two contrasting informal reading programs. One group of children was directed to learning words and reading simple stories; letters and a sound analysis was explicitly avoided. The other group was taught words in terms of letters and their sounds. Teachers worked with the children in small groups once or twice

weekly and on an individual basis during the daily play periods. Teachers were coached to turn answers to children's questions into the framework fitting the type of instruction being used (e.g., "Teacher, what's this word?" "That word is stop; remember seeing that on the road signs?" or "That word is stop. See, it begins st and ends with a p."

The purpose of the alternate instructions, it should be emphasized, was not to find a significant instructional difference, but, through the control of a portion of the child's time, to determine whether the development of reading would be affected by these contrasting approaches.

Method

Subjects. Twenty subjects for each instructional program were enrolled in September for a two and one half hour daily, 5-day a week program. In January, two additional children joined each instructional group. The program was terminated in May. Children were selected for the program on the basis of their age (between 3 1/2 and 5 years) in September, and sex (balanced groups).

Tasks and measures. One observation and four tasks were used.

(1) To determine whether the type of instruction would affect play behavior, the children were observed during the hour-long play periods when, presumably, children's activities would vary only according to the preferences of the children. The behaviors tabulated were instances of reading, writing, or looking at books as compared with any other behavior. Observations were gathered for five-second intervals to obtain at least ten observations at a time for each child. Observations were obtained every three weeks; altogether

approximately 100 observations were gathered for each child. The order for observing the children was prearranged in order to keep the observers from biasing the selection of children. Instances of reading, writing, and book activity were summed and expressed as a proportion of the total time observed. These proportions were later transformed to arc signs for statistical analysis.

(2) A word learning task was used to assess an effect of type of instruction on long term recall of print. Six concrete nouns were taught (elephant, camel, fork, plate, cup, shoe). In the letter instruction group, the teacher taught the words by pointing out the letters in the words. In the word group, the teacher emphasized the context of the word in sentences and matching the printed word to pictures. Two weeks later and again six months later, an experimenter showed the printed words to each child and asked for the pronunciation of each word. The score on each test was the total number of words correctly read.

(3) A word reading task was given in order to determine whether either instruction had facilitated recognition of untaught, three-letter printed words. Half the words were common and half were uncommon. Common words included cow, dog, got. Lug, bur, nor were three of the uncommon words. Children were shown hand-printed cards and asked to say the word. The score was the total number of words correctly read out of 16 words.

(4) A test of alphabet name knowledge was administered in order to compare the two groups' knowledge of letters. Five one-inch high upper case letters were displayed on a page and the child was asked to point to the letter named by the experimenter. The score was the total number of letters correctly identified. The letters tested were R H V O S I K B U J P Y.

(5) A symbol recognition test (R. Calfee, personal communication) served to determine whether instruction had affected ability to identify novel letter-like symbols. Children were asked to match two symbols printed at the top of the page with one or more pairs that were exact matches. The foils included reversals of the symbol pattern and alternations in the pattern. The procedure for this task was taught to the children with two examples to explain that a letter reversal was an incorrect response. There were twelve items in the test. A score was registered for the total number of correct matches.

Results

In order to consider a simultaneous effect of the tests, a one-way multivariate analysis of variance was performed. The results indicated that the two instructional groups were significantly different ($p < .05$). The Wilks' Lamda resulting from the analysis was equal to .1717.

A discriminant analysis was run to aid in interpreting these results. The structure matrix and standardized weights are presented in Table 1. The variable with the heaviest weight was the word learning retest.

Insert Table 1 about here

Table 2 lists the means of each test with respect to the two instructional programs. Alphabet recognition and observed time in reading activity favored the letter treatment group while word pronunciation, symbol recognition, and the word learning tasks favored the word treatment group. However, an examination of the mean differences on each test, confirmed by follow

up *t* test comparisons, suggests that the instructional effect is due mainly to methods used to teach six words, but not to reading in general. The word learning test given two weeks after training was significant at $p < .01$, $t(35) = 2.53$. The test given after six months was significant at $p < .01$, $t(34) = 2.74$.

Insert Table 2 about here

There were also significant fall and spring semester observed differences between the two groups in time spent on reading and related activities. In the fall, the word instruction group spent more time with reading materials, $t(37) = 3.3$, $p < .01$, while in the spring, the letter group had a higher mean, $t(35) = 1.8$, $p < .05$.

Discussion

The overall significant instructional effects are not robust since it could be argued that the obtained results would be insignificant if the word learning tests were not included (as indeed was true, when a second multivariate analysis was run omitting these tests). On the other hand, given the very similar letter-recognition scores of the two groups it seems likely that the letter instruction was not providing new information.

The observed greater time spent by the letter treatment group in reading activities was unexpected. The original analysis had included only spring semester behavior (based on the argument that later effects of the instructions were the more relevant). When an effect contrary to what was expected was obtained, the fall semester observations were analyzed; results were

obtained which conformed to the original predictions (see last two rows of Table 2). Reflecting on this change, it was recalled that during the fall semester only the word treatment group had had access to teacher-made stories but, because of their popularity, the stories were made available to both groups in the spring. Since the stories contained repetitive phrases, 6-10 word vocabularies, picture clues and a punch line ending, many children could read them after one introduction by the teacher. Their strong appeal suggested that the observed differences were a function of book novelty.

The slightly superior performance of the children in the word oriented program indicates that opportunities to memorize printed words and phrases, read very simple repetitive stories, and relate printed words to pictures does correspond with preschoolers' abilities and interests. A word approach is also more relevant when preschool children watch educational television and rehearse letters from alphabet books; an instructional repetition under these conditions of letter information appears to be unnecessary.

Experiment 2

The significant word learning effects when taught with picture clues in Experiment 1 suggests that the 4-year-old children did not attend to letter information so much as to whole words. The printed word itself, even when referencing familiar or known objects, was easier to remember when it was related to picture information than to letter clues. Perhaps letter information is too abstract or not yet relevant as a clue for remembering printed words. This viewpoint is supported by Vygotsky (1962) who concluded that the abstract quality of written language is a principal

problem in learning to read. Written language is more distant from immediate concrete reality than is spoken language. The young child usually uses spoken language to reference objects or their pictures that are visualized at the time of speech. So it may be that remembering printed words can be facilitated by reminding children of the object the word refers to through picture clues.

Since the word learning test of Experiment 1 was carried out in group teaching situations, the aim in Experiment 2 was to determine whether the effects would be replicated in a controlled experimental setting. It was decided to ask children to learn a small set of words by matching them to pictures or to the initial letters of the words. Relating a word to a picture was expected to reduce the abstract nature of the task more than relating a word to letter information. Thus, the word learning rate was expected to be higher for the picture-match task than for the letter-match task.

Method

Subjects. Twenty-two children from the preschool center were selected. There were an equal number of boys and girls; all of them were four years old. None of the children tested could read any of the words initially.

Procedure. Eight words were taught to the children either by matching the printed word to a picture of the word or to the initial letter of the word. The child was placed at a table where eight letters or eight pictures were displayed. The eight words, hand-printed on 3 x 5 cards were handed to the child and the child was told, "Put the word with the picture (or letter) it belongs with and tell me the word." Errors were corrected immediately,

followed by an explanation of why the cards belonged together. There were five trials altogether. After each trial, the word cards were shuffled and the pictures (or letters) were rearranged. A 10-minute intervening task was placed between the fourth and fifth trial in order to approximate a long term recall situation. The words to be learned were bird, clock, floor, nail, hill, steak, post and weed.

Results and Discussion

An analysis of variance showed a small effect of the training condition, $F(9,20) = 3.34$, $p < .10$, an effect of trials, $F(4,80) = 12.80$, $p < .001$, and an interaction, $F(4,80) = 2.60$, $p < .05$. The interaction is displayed in Figure 1.

The superiority of the picture condition over the letter condition after the first trial demonstrates the facilitative effect of learning print by relying on a meaningful, visual representation. That the effect was not diminished on the delayed fifth trial indicates the long-lasting quality of the learning. Even though each word children tried to learn began with a different letter, making a letter-matching strategy viable, this kind of clue was much less effective than pictures.

The results suggest that relating printed words with pictures reduces the abstractness of a word recognition task. The maintenance of the effect over time indicates the relative permanence of the effect. It is apparent that 4-year-olds can easily learn to recognize printed words, particularly when the words are accompanied by a pictoral representation.

Insert Figure 1 about here

Experiment 3

Experiment 1 showed that the 4-year-olds recognized most of the letters at the end of the year (96% correct). Yet, in Experiment 2, letters were not good clues for remembering words. This may have been because the children did not attend to letter information--their memory of print might have been in terms of a total configuration. Alternatively, children may have been confused about what connotes a different word. Did they know, for example, that size, color, and context are not relevant criteria for distinguishing same from different words?

To determine whether 4-year-olds understand what connotes print similarity, a picture of a common object (e.g., dog, book, flower) was drawn on the center of a 9 x 12 card. The name of the object was printed in lower case letters directly underneath. Surrounding the picture were seven variations of the word: an exact match, a color change, change in the size of the letters, letter case change, letter reordering, vowel change, and consonant change. The color, size, and letter case changes did not, of course, change the intent of the word; the other three marked changes that violate our notion of word identity. The task for the children was to point to the words which did not say the same thing as the word under the picture.

Method

Subjects. The six oldest children from the day care program were tested. Their ages ranged from 51 months to 65 months. These children had not been tested previously by this author except to determine that they could recognize and name letters.

Procedure. A 9 x 12 card was placed in front of a seated child. The child was asked to name the picture; then it was explained that the word under the picture said that name. The child was told that his job was to point to all the printed words around the picture that did not say the same thing. If necessary, he was coached to look for more than one word. The task was repeated for 10 word cards.

Results and Discussion

Summary tabulations are listed in Table 3. The six children made 141 wrong responses altogether. Only 18 of the first 4 categories were errors, most being an effect of the letter case change. The children understood that size and color were attributes to be ignored in discriminating similar from different words. They were also very accurate in identifying a consonant change. They did not reliably discriminate vowel changes and letter reordering. All of the children correctly avoided pointing to the exact match, indicating that the task was understood.

Insert Table 3 about here

The intent of the task was to determine whether preschool children understand what characterizes sameness in print. The results demonstrate, without need of a statistical confirmation, that they understand that size and color are attributes which can be ignored while consonants are not to be ignored. Some ambiguity exists when the letters are transformed from lower to upper case. The fact that they did not discriminate vowel and letter reordering changes but did discriminate consonant changes suggests that they do not use letter shape clues alone but attend to some extent to letter sounds.

The results permit the conclusion that preschool children attend, though not with complete accuracy, to relevant letter information. Thus, the better performance under picture information than with letter clues in Experiment 2 is not likely to be a result of confusion about what letter information is critical. Instead, it is likely to be due to the semantic support for memory that is provided by pictures.

Experiment 4

Experiment 3 indicated some confusion by children over letter case shifts. Many of the response errors were caused by children signaling that a word in upper case letters was not the same word. Since lower and upper case letters are often presented casually in beginning reading programs, it is important to know whether this undergeneralization error occurs frequently.

A task was devised in which children would learn a set of words, some in upper case, some in lower case. After four trials the case would be shifted and the children measured for the learning decrement between fourth and fifth trials.

Method

Subjects. Forty-four children who had participated in the first experiment were tested just before the end of the school year. Although eight children could read some of the words, they were included because the interest here was in the magnitude of the effect of the letter case shift.

Procedure. Twelve words handprinted on 3 x 5 cards were presented one at a time. Three words (TOY, RABBIT, BIKE) were in upper case, three began with a capital letter (Top, Boy, Rat), and six were in lower case (tree, truck, bead, ball, road). For four consecutive trials with the words shuffled after each trial, children were asked to pronounce each word. If they did not know or made an error, the correct pronunciation was given. On the fifth trial, another set of twelve words was substituted. The three words in upper case were changed to lower case, three of the lower case words appeared in upper case, and the other six were changed only with respect to the initial letter (e.g., tree to Tree or Boy to boy).

Results and Discussion

An analysis of variance measured the change between the fourth and fifth trials. Independent variables were the trial condition and the Experiment 1 letter versus word instructional group condition. There was a significant effect of the letter case shift from trial 4 to trial 5, $F(1,40) = 53.5$, $p < .001$. There was no instructional effect and no interaction. The mean number correct out of 12 words on trial 4 was 5.57 and on trial 5 was 2.98.

The results demonstrate the debilitating effect of a letter case shift. Most of the 44 children were affected by the change. Of the 11 children whose scores did not decrease, 6 were reading all 12 words on the fourth trial, 1 had read 10 words, and 4 had not recognized any words on any trial. Eight children read all 12 words on the fourth trial; only 2 of the 8 were hampered (recognizing fewer words on the last trial). Altogether, 7 children out of 44 understood that letter case changes do not affect the pronunciation

of words. This means that 37 or 86% of the children tested had not generalized the nature of letter case changes in recognition of printed words. On the other hand, since 6 out of the 8 who read all the words were not affected by the last trial, it can also be said that 75% of the more able readers were generalizing appropriately.

Experiment 5

A questionnaire was sent to parents of preschool children at the beginning of the school year and was repeated at the end of the year. The purposes of the questionnaire were to determine what children knew about letters and words and how they used them in their play, how they changed in their knowledge and use of letters and words, and what was the nature of that change. Twenty-seven questions were asked, tapping these topics: 1) parents' opinions of their children's emerging skills in recognizing letters and words, 2) parents' perception of their children's interest in letters and words, and 3) parents' descriptions of the roles they played in fostering reading.

Method

Subjects. The 40 parents of the children who had participated in the first experiment were sent questionnaires. All 40 returned the first questionnaire and 38 of the 40 returned the second. The subsequent analyses were based on the sample of 38.

Procedure. The questionnaire was taken home and returned by the children. An accompanying letter urged parental cooperation in order to assist the experimenter in finding out what young children understand about reading. A copy of the questionnaire is in the appendix.

Results

Four analyses were carried out. The first was of a descriptive nature, the second indicated what sorts of changes had occurred, the third documented a change in children's knowledge of printed words, and the fourth validated that measure.

Summary tabulations showed that by the end of the school year the children had required considerable knowledge about letters and words and practiced this knowledge in their play. With respect to letter knowledge and use, 95% of the children could recognize more than 20 letters and 63% named alphabet letters very often in play. Eighty-two percent could print more than 20 letters, 76% utilized both upper and lower case, and 50% very often printed letters onto their drawings. They were nearly as proficient with words since 63% could read more than 20 words. When they couldn't read a word, 63% very often asked for the word to be identified, 76% very often spelled out the word, while 26% very often tried to sound out the word.

Books played a major role in the children's lives. Seventy-three percent very often asked to have books read, 89% were read to more than one hour per week while 55% were read to more than two hours per week. Surprisingly (until one recalls that these children could take home the teacher-constructed books described in Experiment 1), 42% very often read books by themselves while an additional 26% occasionally read alone. Every child owned at least one alphabet book; 74% owned several. Thirty-four percent of the children visited the public library at least once a month.

Television assumed a time-consuming role in the children's lives. Fifty percent watched TV more than two hours daily; 92% watched it at least

one hour every day. Sesame Street was watched very often by 66% of the children, Electric Company by 42%, and Saturday A.M. cartoons by 53%. Thirty-four percent of the children very often discussed the programs with parents while an additional 50% occasionally discussed the programs.

The second analysis was with regard to a change over the school year as perceived by parents. Proportions of responses given in September and May are listed in Table 4. These were analyzed with a Chi square statistic to assess change over time of letter and word knowledge. The September

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Insert Table 4 about here

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tabulations, usually described as "seldom," "occasionally," and "very often," were considered the predicted scores while the May figures for the same responses were the observed values. The results, based on 2 degrees of freedom and on a .01 level of probability, showed that there were highly significant gains in letter and word knowledge. By contrast, changes did not appear with regard to book availability and television interest. It is apparent that while letter and word knowledge changed, the support for reading at home did not alter.

The third analysis concerning the nature of word knowledge was possible because parents had been asked to list up to 20 words that they had noticed their child could now read. The responses indicated that nearly 70% could recognize at least one word in September and, by May, all could read at least one word and more than 50% were reading 20 or more words. There was a mean of 3.9 reading words in September and 9.3 words in May. Further, the type of words parents listed had changed. In September, 78% of the words

listed were labels, signs, nouns, or pronouns. In May, the proportion of labels had decreased from 43% to 28% while the proportion of nouns, verbs, and other form classes had increased (see Table 5).

Insert Table 5 about here

The changes in the types of words parents listed over the 9-month period indicated that these changes were related to the number of words children read, hence to their developing understanding of words in print. Four stages were identified. Nonreaders comprised the first stage. Children who knew fewer than five words were reported to know their name, a few labels (cereal names and other food labels predominated the listing), and store or road signs (particularly, stop and exit). These children were called context-dependent readers. Children who read about 10 words were reported to recognize, additionally, common nouns such as dog, cat, or boy and a few short function words such as up or go. These children were labeled distinctive word readers. Three children were reported in May to have an unlimited reading vocabulary. As examples of new words, parents listed multisyllabic words and abstract nouns (e.g., research, restaurant, country). These children were labeled abstract word readers. The median string length of the context-dependent readers was 3.0, of the distinctive word readers it was 3.6, and the abstract word readers had a 6.75 median word length. A Chi-square analysis tabulating the number of children at each level in September and May indicated a significant change (see Table 6). From an inspection of the scores, it can be seen that the greatest change occurred

between the third and fourth stages. Most of the 4-year-olds shifted from context dependency to the notion that print can represent objects. The three who moved to an awareness of the abstract character of lexical information may have been unusually gifted children. This order of development has also been noted by Ehri (1975, 1977) and Holden and MacGinitie (1972). It is interesting that this order is similar to a developing awareness of words, then phonemes, as separable linguistic units (e.g., Bruner, 1975; Huttenlocher, 1964; Karpova, 1955).

Insert Table 6 about here

Data from the fourth analysis was extended to determine which parental responses were correlated in September and again in May with the stages of word reading. A nonreader was assigned a value of 0, a context-dependent reader a value of 1, a distinctive word reader a value of 2, and an abstract word reader a value of 4. The 3-leveled responses of the questionnaire items (e.g., seldom, occasionally, very often) were also assigned values of 1-3. It was assumed that if the four stages of word reading indicate early progress in learning to read, this measure should be correlated with letter knowledge, word recognition strategies, and home influences. These correlations are listed in Table 7.

Insert Table 7 about here

There was a high correlation between word reading and letter knowledge in September but in May the correlations for naming letters was lower.

This may be explained by assuming that naming letters is learned earlier than printing and recognizing letters in words. There was a comparable change among the word recognition strategy items: asking for words and spelling out letters, which are less effective word recognition strategies, showed a reduced correlation over time while the sounding out strategy became more closely related as the children became better readers. As expected, visiting the library, watching Sesame Street and discussing it with parents were positively correlated with the reading measure. The unexpected low correlation between word reading and being read to may have occurrrd because the question was poorly phrased. On all other items, the correlations agree with findings of other researchers, suggesting that the four stages of word reading do indicate early progress in learning to read.

Discussion

Summary tabulations determined that the 4-year-olds had acquired an appreciable background for reading. Most of the children were able by May to recognize names and to print a majority of the letters. With respect to letter case, a later inspection of parental reports indicated that every child learned to print in upper case first or simultaneously with printing in lower case. Word reading was also more advanced than has heretofore been suggested in the literature. In September, only four of the 38 children could not read any words; by May all were recognizing, minimally, their name, labels, and signs.

The advancements in letter and word knowledge made within a 9-month period signify how rapid the progress can be in reading readiness. The

greatest changes occurred in printing letters and in reading words. Initially less than half of the children printed more than five letters but by the end of the school year, over 80% were printing more than 20 letters. Initially they printed in upper case; in May the same proportion used both cases. With word knowledge, at first nearly half read fewer than five words while in May 63% were reading more than 20 words. Moreover, the type of words they read shifted from labels and signs to words that are found in books. This measure, which was correlated with word and letter measures of reading progress, showed that a gain in word knowledge was the norm. In September 84% of the children were non-readers or context-dependent readers. In May this percentage had dropped to 37%; the majority were distinctive word or abstract word readers.

It is evident that children are substantially influenced by our print-laden environment before entering public school. They acquire knowledge of upper case letters before lower case letters because the child's eye sees billboards, road and store signs, and labels on food boxes and jars. These words are, for the most part, in upper case. So, also, they recognize words in the environment befitting their views of the printed world. The words most often cited by these parents were the signs stop and exit.

The analyses of the questionnaire demonstrate that middle class children have an extensive knowledge about letters and words and are provided with a favorable environment for furthering that knowledge. Four-year-old children recognize words, especially labels and signs; a few have an extensive reading vocabulary. They can recognize letters, name them, print them, and use them

to recognize words. A few even use the sounds of the letters to identify words. An ordering of skills, which was not obvious from these analyses, was assessed a year later. A questionnaire was sent at the end of the school year to another group of parents at the preschool. Twelve skills were listed which parents were asked to rank according to the order in which their child's skills had been acquired. These are listed by their ranked mean values in Table 8.

Insert Table 8 about here

Letter knowledge heads the list: most of the children learned to recite the alphabet first, then began printing and recognizing their own name (name recognition may be untypical because the children studied were required to wear name tags in school). All 30 children were accomplished letter namers and printers at the time of this assessment. Next in rank were the label and sign reading skills which 75-80% of the children had acquired. Noun and preposition reading was ranked lower but had been acquired by a similar proportion. Lastly were abilities to read verbs and abstract nouns, acquired by 35-40% of the children.

The ranking agrees closely with the word reading levels and parental reports of print and word knowledge found earlier. The first step in reading was found to occur in recognizing and printing letters. Shortly afterward the children began reading words, at first those which could be recognized by context and were most apparent to the child, and later those which referenced familiar objects. The children's own names which played a

prominent role in school activities were recognized early, followed by an ability to read traffic signs and other signs and labels. Knowledge of verbs and abstract words seldom occurred among these children, presumably because reading these words requires decoding skills that are beyond a reading readiness level and because these words demand a more mature linguistic awareness.

General Discussion and Conclusions

Reading educators have distinguished beginning reading from reading readiness but their instructional programs for reading readiness have differed widely. The reason appears to be that curriculum designers and researchers have approached the implementation of reading readiness by relying on tradition or by dissecting and sequencing the skills of skilled readers. Few have organized the components of a readiness program by assessing what 4- and 5-year-old children know or can easily learn about print. The purpose of this study, then, was to track the successes of 4-year-old children in acquiring knowledge of the printed world, determine the order to the acquisition of this knowledge, and analyze the kind of environment in which this occurred.

Experiment 1, which contrasted a letter instructional approach with a whole word instructional approach, showed that the two approaches affected particularly the children's word knowledge. An emphasis on whole words led to somewhat greater word recognition skill than did an emphasis on letters while a letter approach did not cause significantly greater letter knowledge. The word effect appeared to be due, in part, to the use of very

simple, amusing stories which had been written by the teacher, printed on cardboard pages (acquiring a weightiness that could not be reflected by the 8-page limit), and treated by children as books that were read in school and borrowed for home use. The difference was also due to the method used for teaching children to recognize printed words. Picture-word associations facilitated recognition more than did letter-word analysis.

The second experiment confirmed in a controlled setting the last point. Children were better able to pronounce isolated words if they matched them with pictures instead of letters. When children first begin to learn to read, printed and spoken words are not very meaningful (Sinclair-deZwart, 1973). Seeing the print with a picture then provides that additional cue which allows the child to put the information together and relate it to familiar concepts.

Experiment 3 determined that 4- and 5-year-olds have begun to attend appropriately to letter information. They know that size and color of letters do not count while changing a consonant does matter. They are less confident about letter case changes, letter reordering and vowel changes. This indicates that any program of instruction may assume that word discrimination skills are partially but not completely mastered.

Experiment 4, which measured more precisely the children's ability to discriminate words when the letters were changed in case, showed that only 16% of the children were not hampered by the letter case shift. An instructional program, then, should include explicit practice in recognizing upper, lower, and mixed case words.

Experiment 5 provided the longitudinal data for describing the acquisition of letter and word skills. It was found that children made rapid progress in both reading readiness areas. They learned to name, recognize and print letters, they becan using letters in their play and art work, and they used letter information in trying to recognize words. Word reading proceeded from their own name to signs and labels, then to nouns and prepositions, and, for a few, to verbs and abstract multisyllable words. This ordering was confirmed by another group of parents from the same population.

Definition and Description of Reading Readiness

These analyses have led to a definition of reading readiness which characterizes middle class children. Before children begin to read formally, they have learned to recognize their names and to print letters in upper and lower case; they also recognize commonly appearing signs, labels, and a few 2-3 letter nouns and prepositions. They often use letter names or sounds to spell or pronounce an unknown word.

The order of acquisition appears to be a recognition and printing of letters, followed closely by reading signs and labels and learning letter sounds. The stage of distinctive word reading follows later as the child transfers his skills to a recognition of short words in stories. This ordering demonstrates a natural sequence of the development of letter and word knowledge under favorable conditions and circumstances. What are these conditions?

At home children have their own alphabet books, they are read to frequently and hear story records, they use the library, they watch educational television, and they discuss the television programs with their parents. They are encouraged to print their names, write headings on their pictures, and read labels and simple stories. Reading instruction is not deliberate; letters and words gradually assume a larger part of the children's play, art activities, and social experiences. Learning letters and printing words is made useful to the children since they like to print words or phrases on their pictures (some even try to create a story), and they enjoy demonstrating their ability to read to each other, and to adults. Reading readiness skills are acquired, then, in a manner that integrates reading with play and other everyday activities; as a result, the children do not think that it is difficult to learn to read.

A reading readiness program, ideally, should lead the children to an understanding of print by making reading a very familiar experience, providing positively reinforcing situations for success in printing and reading, and setting up situations where learning occurs through a need to use letters and printed words. This favorable environment is not difficult to implement at home and in preschool and kindergarten settings where reading activities can be fostered through play, art, music, field trips, story telling, reading, and talking about letters and words. Whether this kind of a program is sufficient for children who have not obtained satisfactory language or cognitive background experiences is not possible to determine from this study. This research does demonstrate, however, that reading readiness

can be explicitly defined and ordered into a naturally occurring hierarchy, and that in a favorable environmental setting even 4-year-old children can acquire an extensive background (and, in all likelihood, a sufficient readiness as well) for formal reading.

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Footnote

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Table 1

Structure Matrix from the Instructional Comparison

Variable	Correlation with discriminant function	Standardized discriminant weights
Word reading test	0.177	-1.55
Symbol recognition test	0.233	.90
Alphabet recognition test	-0.214	-1.64
Word learning test	0.613	1.10
Word learning retest	0.706	3.59
Spring observation	-0.446	-1.23

Table 2

Mean Test and Observation Scores of Letter Treatment and Word Treatment Groups

Variable	Letter treatment	Word treatment
Word reading (number correct of 16)	0.889	1.368
Symbol matching (number correct of 12)	5.889	7.000
Alphabet recognition (number correct of 12)	11.778	11.368
Word learning (number correct of 6)	1.333	3.000
Word learning retest (number correct of 6)	1.059	2.579
Fall observation (Arc Sin)	1.124	0.983
Spring observation (Arc Sin)	0.899	1.189

Table 3

Tabulation of Correct and Incorrect Responses and Nonresponses to a Word Discrimination Task

Responses	Correct		Incorrect	
	Number	Percent	Number	Percent
Exact match	60	100	0	0
Smaller size	58	97	2	3
Color change	60	100	0	0
Letter case change	44	73	16	27
Letter reorder	40	67	20	33
Vowel change	24	40	36	60
Consonant change	58	97	2	3

Table 4

Proportion of Responses to Selected Questionnaire Items

Item	September proportion[a]	May proportion[a]	Chi square[b]
Printing letters			
(1) Prints fewer than 5 letters	.55	.08	
Prints more than 20 letters	.13	.82	156.0
(2) Does not print at all	.11	.00	
Prints in upper case only	.71	.21	
Prints in lower case only	.00	.03	
Prints in both cases	.18	.76	86.5
(3) Seldom prints letters in drawings	.34	.16	
Very often prints letters in drawings	.24	.50	15.4
Naming letters			
(1) Recognizes fewer than 5 letters	.29	.03	
Recognizes more than 20 letters	.58	.95	21.2
(2) Seldom recites alphabet without error	.26	.11	
Very often recites alphabet without error	.47	.76	12.8
(3) Seldom identifies letters in play	.26	.39	
Very often identifies letters in play	.08	.63	10.6
Reading and decoding words			
(1) Reads fewer than 5 words	.47	.11	
Reads more than 20 words	.08	.63	160.8
(2) Seldom spells out letters in words	.42	.24	
Very often spells out letters in words	.13	.76	45.1
(3) Seldom asks for printed word to be read	.26	.11	
Very often asks for printed word to be read	.26	.63	26.8
(4) Seldom sounds out letters in words	.76	.42	
Very often sounds out letters in words	.00	.26	106.8

Table 4 (continued)

Item	September proportion[a]	May proportion[a]	Chi square[b]
Book availability			
(1) Has no alphabet books	.03	.00	
Has several alphabet books	.68	.74	1.2
(2) Goes to library irregularly	.66	.66	
Goes to library at least twice monthly	.08	.08	.4
(3) Is read to less than one half hour per week	.00	.03	
Is read to more than two hours per week	.84	.73	3.0
(4) Seldom asks for books to be reread	.08	.16	
Very often asks for books to be reread	.69	.58	3.7
Television interest			
(1) Seldom watches Sesame Street	.05	.05	
Very often watches Sesame Street	.79	.66	5.0
(2) Seldom watches cartoons	.16	.11	
Very often watches cartoons	.55	.53	1.5
(3) Seldom watches Electric Company	.24	.21	
Very often watches Electric Company	.50	.45	1.8
(4) Seldom discusses Educational TV with parents	.16	.16	
Very often discusses Educational TV with parents	.42	.34	1.1

Note. Most of the entries in this table report the percent responding "seldom" or "very often," omitting the middle response, "occasionally." The Chi Square statistic, however, included the middle class.

[a]Each proportion is based on the repeated sample response of 38 parents. There are no missing data.

[b]With 2 df, a Chi Square value greater than 9.21 is significant beyond the .01 level of confidence.

Table 5

Tabulation of Types of Printed Words Recognized by 4-Year-Old Children

	September response (148)	Proportion	May response (348)	Proportion
Labels[a]				
Stop	16		26	
Other road signs	1		7	
Exit	9		11	
Cereal names	12		15	
City and store names	12		16	
Drink and food labels	11		16	
Card and book labels	3		6	
Total labels	64	.43	97	.28
Nouns and pronouns				
Cat, dog	12		23	
Other animals	1		4	
Mom(my), Dad(dy)	15		28	
Boy, girl, he, she, me	2		11	
Food items	3		31	
Clothing items	0		4	
Household items	9		16	
Outdoor items	1		12	
Numbers, colors	2		11	
Abstract nouns	6		20	
Total nouns and pronouns	52	.35	160	.46

Table 5 (continued)

	September response (148)	Proportion	May response (348)	Proportion
Verbs				
Go	9		15	
Other verbs	0		13	
Total verbs	9	.06	28	.08
Other words				
Yes, no	11		21	
Up, in, out, the	8		31	
Adjectives, adverbs	4		11	
Total other words	23	.16	63	.18
Grand total	148	1.00	348	1.00

[a]The child's own name was omitted from the listing.

Table 6

Chi Square Analysis of the Proportion of Children at Each Word Level as a Function of Time

	September	May
Non readers	.13	0.00
Context-dependent readers	.71	.37
Distinctive word readers	.16	.55
Abstract word readers	.00	.08

Note. Chi Square = 57.8, $p < .01$.

Table 7

Correlations Between Word Reading and Selected Questionnaire Items

	September word reading stage	May word reading stage
Letter knowledge and use		
Names letters in play	.37**	.13
Recites alphabet	.42**	.25*
Recognizes letters in print	.31*	.27*
Prints letters	.34*	.33*
Word recognition strategies		
Asks for word	.31*	.23*
Spells out letters	.32*	.07
Sounds out letters	.46**	.54**
Home influences		
Asks for book to be read	.18	-.13
Listens to story records	.32*	.17
Visits library	.12	.25*
Watches Sesame Street	.31*	.30*
Watches Electric Company	.07	.16
Watches cartoons	-.01	.05
Discusses TV with parents	.52**	.23*

*$p < .05$.

**$p < .01$.

Table 8

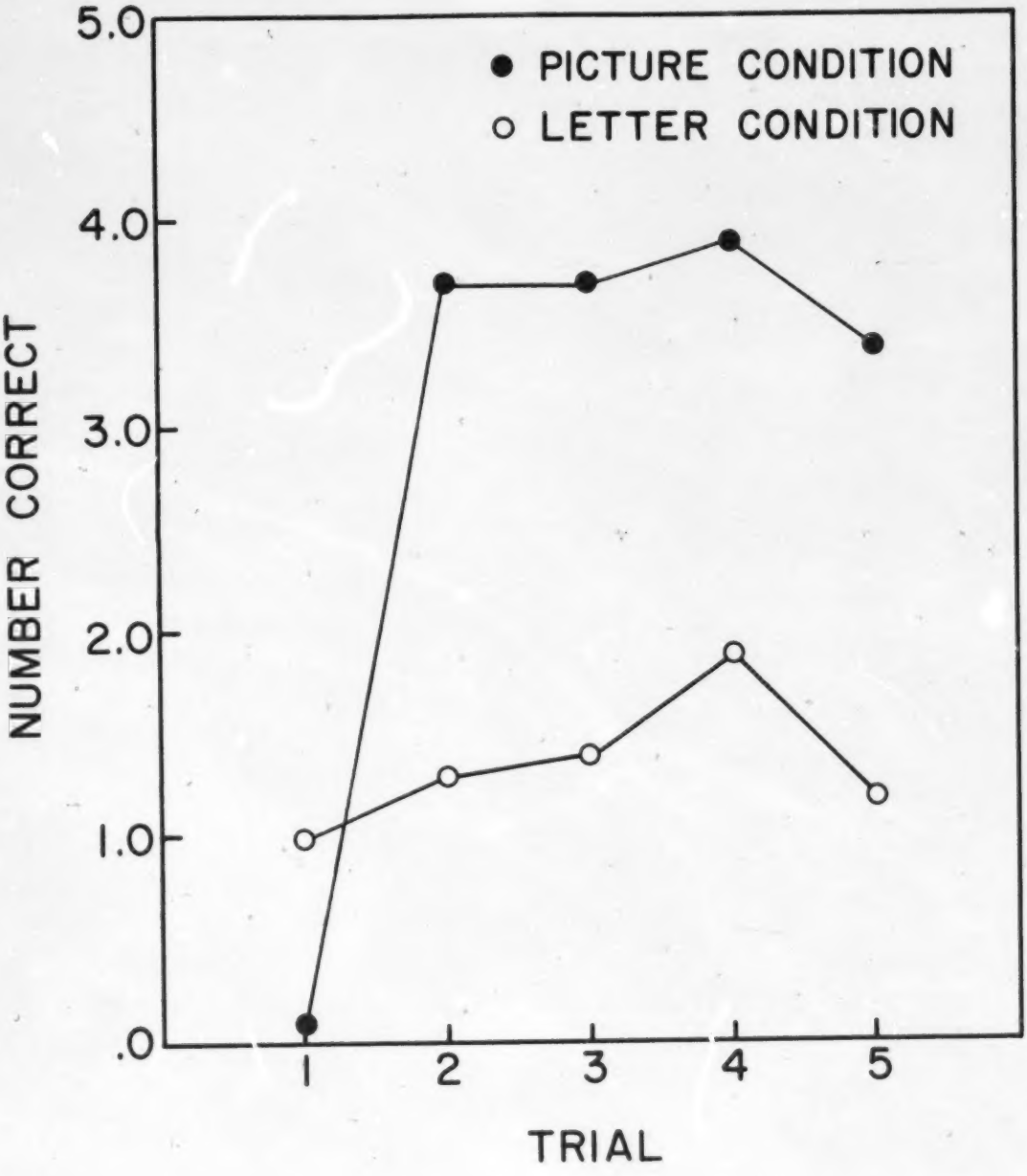
Order of Acquisition of Twelve Reading Readiness Skills

Skill	Mean rank	Modal rank	Number reported[a]
Recited letters	1.5	1.0	30
Said letter names	2.9	2.0	30
Read own name	3.8	2.5	30
Printed letters	4.4	3.0	30
Read traffic signs	5.6	4.0	25
Said letter sounds	5.8	5.0	22
Read store signs	6.1	6.0	22
Read food labels	6.9	6.0	24
Read nouns	7.5	10.0	22
Read prepositions	7.7	9.0	22
Read verbs	9.4	11.0	12
Read abstract nouns	10.5	12.0	11

[a]Parents of thirty 4- and 5-year-old children answered this question. The reduced number reflects skills not acquired at the end of the school year.

Figure Caption

Figure 1. Number of words pronounced correcily under two learning conditions.


5.0
4.0
3.0
2.0
1.0
.0
NUMBER CORRECT
PICTURE CONDITION
LETTER CONDITION
1
2
3
4
5
TRIAL

Appendix

Questionnaire

Child's Name _____ Birthday _____

Sex _____ Number of older brothers _____ Sisters _____

Date _____

Directions: For each question, please circle the response that comes closest to describing your child's behavior.

Does the child point out and name letters of the alphabet when playing? Code

seldom occasionally very often _____

How many different alphabet letters does the child try to print?

less than 5 about 10 more than 20 _____

Does the child recite the whole alphabet without any mistakes?

seldom occasionally very often _____

If the child prints, what case does he use?

upper (capital letters) lower both _____

Does someone teach the child some reading skills?

none older brother or sister parent/other _____

If someone is teaching the child, what is being taught? Circle any being taught.

letter names letter sounds _____

printing letters printing words _____

reading words reading stories _____

spelling words other _____

Does the child read books by him or herself?

no occasionally often _____

What new words have you noticed your child reading? List as many as you can think of (but no more than 15) that he identified. For example, did he point out and read labels on food, words in books or magazines? We are interested here in which printed words your child noticed recently.

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

			Code
How many printed words altogether do you think the child can read?			
less than 5	about 10	more than 20	_____
Does the child ask for a printed word to be read to him?			
seldom	occasionally	very often	_____
Does the child ask to have books or comics read to him?			
seldom	occasionally	very often	_____
Does the child try to identify a printed word by sounding out the letters?			
seldom	occasionally	very often	_____
Does the child spell out the letters in printed words?			
seldom	occasionally	very often	_____
Does the child make alphabet letters when drawing?			
seldom	occasionally	very often	_____
How many alphabet letters do you think the child can recognize?			
less than 5	about 10	more than 20	_____
How often is the child read to at home per week?			
less than 1/2 hour	about 1 hour	more than 2 hours	_____
How often does the child visit the public library?			
irregularly	once or twice a month	weekly	_____
Does the child have a subscription to a children's magazine?			
yes		no	_____
Does the child ask to have favorite books reread?			
very often	occasionally	seldom	_____
What is the average time the child watches T.V. per day?			
less than 1/2 hour	about 1 hour	more than 2 hours	_____
Does the child hear story records at home?			
very often	occasionally	seldom	_____
Does the child watch Sesame St. on T.V.?			
seldom	occasionally	very often	_____

Does the child watch Electric Co. on T.V.? Code

seldom occasionally very often _____

Does the child watch Saturday A.M. cartoons on T.V.?

seldom occasionally very often _____

Does the child talk to parents about Sesame St. or Electric Co. material?

seldom occasionally very often _____

How often does the child go on outings with a parent (trips to special places, shopping, visits to friends, etc.) per week?

less than twice a week about four times a week more than 6 times a week _____

Does the child own any alphabet books?

no one several _____

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